

B2  
Cont

a pair of [oppositely] opposed tube-shaped connecting members each having a central axis coaxial with the other and each having a plurality of outer annular grooves, said members being positioned such that a first end of each is adjacent to the other, each groove having a generally arcuate cross-section and laying in a respective plane generally perpendicular to said central axis, each one of said outer grooves [each] having a generally constant radius measured from said central axis whereby each said outer groove on a respective connecting member has a greater radius than each adjacent outer groove closer to [each respective] said first end on said respective connecting member;

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a collar coaxially aligned with said connecting members and adapted to receive and fit around said connecting members, said collar having a plurality of inner annular grooves each having a generally arcuate cross-section and laying in a respective plane generally perpendicular to said central axis, said inner grooves each corresponding to one of said outer grooves and forming therewith an arcuate race; and

a plurality of ball bearings received in each race to facilitate relative rotation of said connecting members and said collar about said central axis.

#### REMARKS

1. The Examiner has indicated that an Abstract of the Disclosure was not submitted earlier. Attached herewith on a separate sheet of paper is an Abstract.
2. The drawings are objected to for not including certain reference signs referred to in the Description. Pursuant to MPEP 608.02(p), attached herewith are proposed changes in red ink, submitted for approval by the Examiner. Upon such approval, formal drawings consistent with the proposed changes will be submitted.
3. The drawings are objected to for failing to designate appropriate portions of Figure 3 as "PRIOR ART". Pursuant to MPEP 608.02(p), attached

herewith are proposed changes in red ink , submitted for approval by the Examiner. Upon such approval, formal drawings consistent with the proposed changes will be submitted.

4. The Specification is objected to under 35 USC 112, first paragraph, for failing to adequately teach how to make/use the invention. The Examiner specified a deficiency at the end of page 5 with respect to describing the center point and offset center point. The Specification has been amended at page 5 by deleting a word, correcting use of reference numerals, and inserting a sentence. It is believed that the amendment will provide a more comprehensive and clear description of the geometry of the groove profile. The Specification has been amended to correct the inadvertent mistake in the use of reference characters to designate the center point and offset center point. The Examiner is correct in pointing out that the center point is represented in the drawings by numeral 428, and the offset center point by 426. The Specification is intended to explain the geometry of the cross-sectional profile of the groove 420 by describing it as having a straight-line portion 425 in what otherwise would be a half-circle shape. The use of the terms "center point" and "offset center point" are one way to describe the shape in terms of radii, i.e. two quarter circles of the same radius are placed adjacent to each other with their center points separated by a short distance in which said short distance accounts for the "straight-line portion 425" on the perimeter. No new subject matter has been added.

5. Claims 9-12 were rejected under 35 USC 112, first paragraph, for the reasons set forth in the objection to the Specification. Claims 9 and 10 are now canceled. It is believed that the rejection of claims 11 and 12 under this section are now overcome in view of the amendment to the Specification.

6. Claims 1-5 and 13 were rejected under 35 USC 112, second paragraph, as being indefinite because of an apparent inconsistency in meaning due to use of the words "constant radius" and "greater radius". Claims 1 and 13 have been amended to

clearly indicate that each groove per se has a generally constant radius, but each groove has an incrementally greater (constant) radius than the adjacent groove. The only significance of the term “constant radius” is to indicate that each groove is incrementally of greater diameter than the adjacent groove. If the Examiner recommends that it is preferable to not use the term “constant radius” in order to satisfy 35 USC 112 requirements, applicant will eagerly consider changing the terms entirely by an Examiner’s amendment or otherwise by using, for instance, language indicating simply that adjacent grooves are of increasing diameter with respect to each other.

In addressing another of the Examiner’s grounds of rejection, the amendment to the claims now makes it clear that there are a plurality of planes perpendicular to the central axis with one groove corresponding to each plane.

The redundancy in claim 13 of “oppositely opposed” has been alleviated by deleting the word “oppositely”.

7,8. Claims 9-12 are rejected under 35 USC 102(b) as being clearly anticipated by Press or German reference 1,907,428.

Claims 9 and 10 are canceled.

Claims 11 and 12 are not clearly anticipated by Press or German ‘428 because neither reference teaches that the inner connecting member has a groove with the claimed “straight-line segment”. In each reference the outer connecting member which telescopically receives the inner member has the straight line segment. Press describes the “wide channel 21” as being attributable to the outer member 12, but not to the inner member 13. German ‘428 shows the wide channel 12 as being attributable to the outer member 1, but not to the inner member 3. Accordingly, the rejection of claims 11 and 12 as being clearly anticipated by either reference should be withdrawn.

9. Claims 13-17 are rejected under 35 USC 102(b) as being clearly anticipated by Ungchusri et al. ‘791.

The Ungchusri patent simply does not disclose or suggest in any way the following claimed elements of independent claim 13: a plurality of annular grooves attributable to each connecting member ; and a plurality of grooves that increase in diameter with respect to each adjacent groove. In all embodiments Ungchusri '791 shows only a single groove attributable to each connecting member. The novelty of the present invention lies in multiple grooves that are stepped, or of increasing diameter moving away from the connector end. Accordingly, the rejection of claims 13-17 as being clearly anticipated by Ungchusri '791 should be withdrawn.


10,11. Claims 1-8 are rejected under 35 USC 103 as being unpatentable over Taeuber, Jr. et al. in view of Phillips or Ashton.

Neither the primary reference, Taeuber, nor the secondary references disclose or suggest in any way the claimed feature of claim 1 wherein each adjacent groove has a greater radius than the next, i.e. stepped grooves. See claim 1, first paragraph. Accordingly the rejection of claims 1-5 under 35 USC 103 should be withdrawn. Claims 6-8 are canceled.

12. The prior art made of record, Waters, discloses grooves that are: 1) configured solely for the purpose of enabling use of the expandable "split band-ring" and thus could not work with ball bearings or be configured of arcuate cross-section as claimed; and 2) decreasing rather than increasing in diameter.

It is believed that the foregoing amendments and remarks are sufficient to overcome the objections and rejections set forth. Allowance of claims 1-5 and 11-17 is requested.

Respectfully submitted,

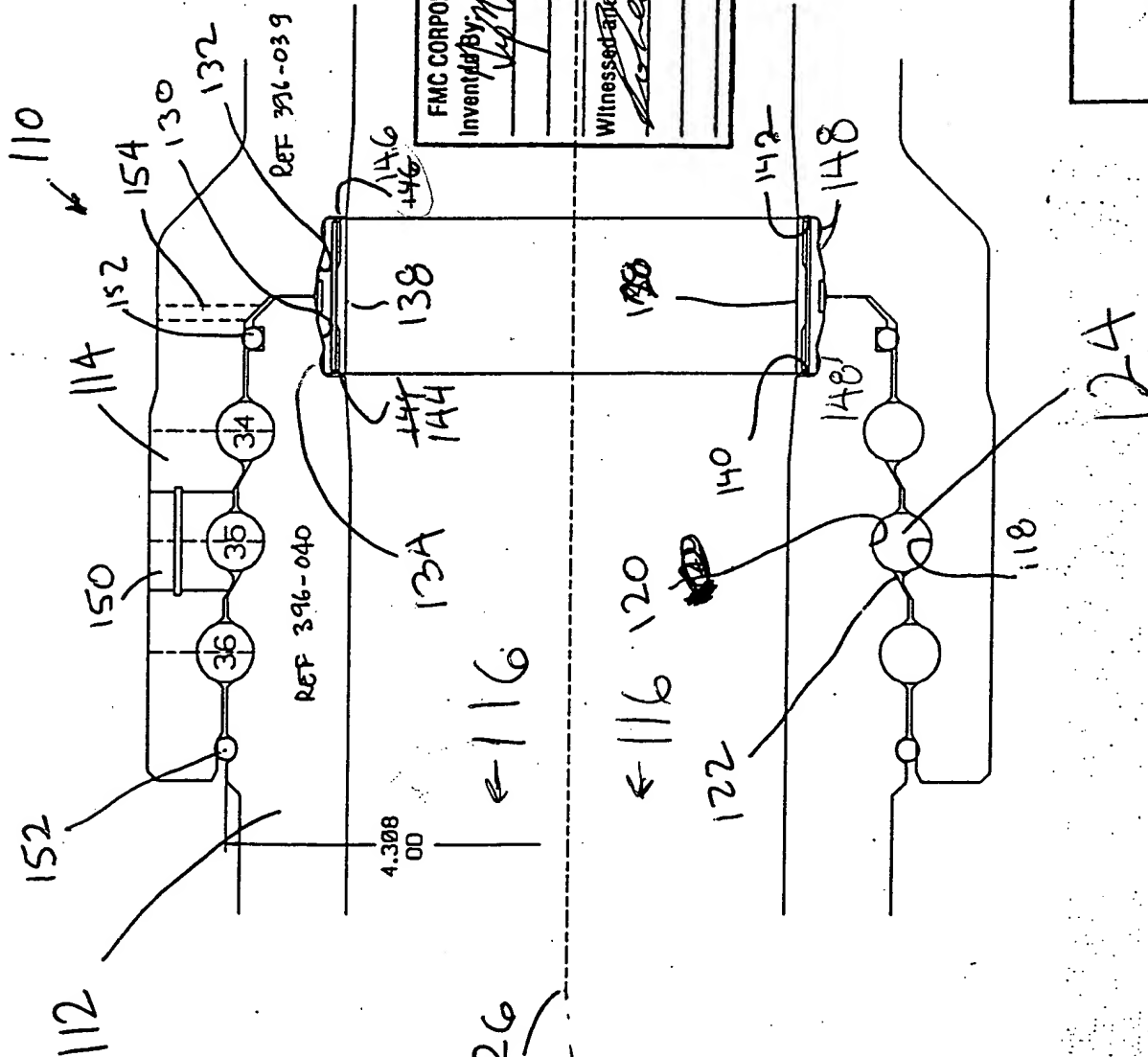


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drawing  
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examiner  
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1-18-96

FIG. 2



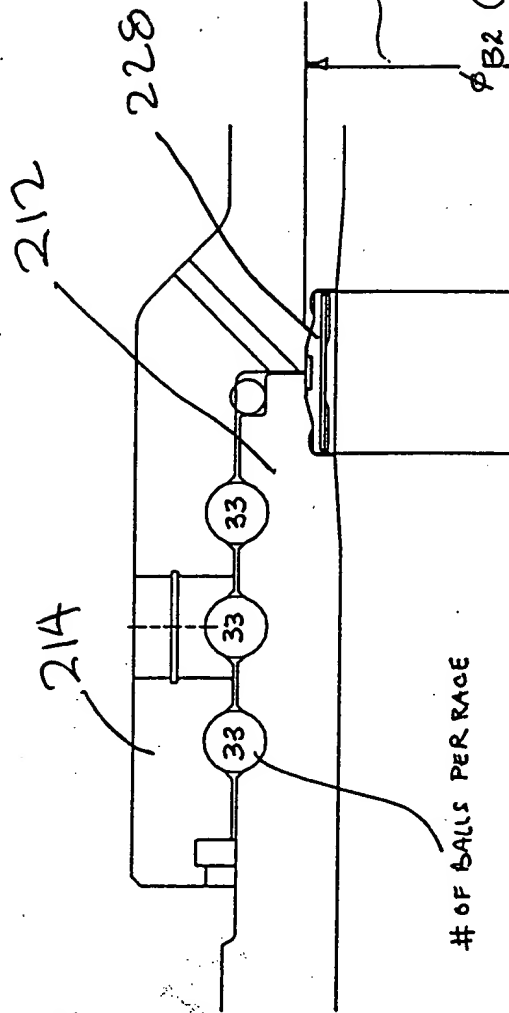
FMC CORPORATION FLUID CONTROL R & D	
Inventor By: <i>[Signature]</i>	Date: 31 Mar 94
Witnessed and Understood By: <i>[Signature]</i>	
Date: 31 Mar 94	

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Drawing  
approved by  
1/18/96 HED

FIG. 3

210 →



# OF BALLS PER RACE

200

$\phi B1$  (CONVENTIONAL  
PACKING BEARING  
DIAMETER)  
 $\phi B2 < \phi B1$

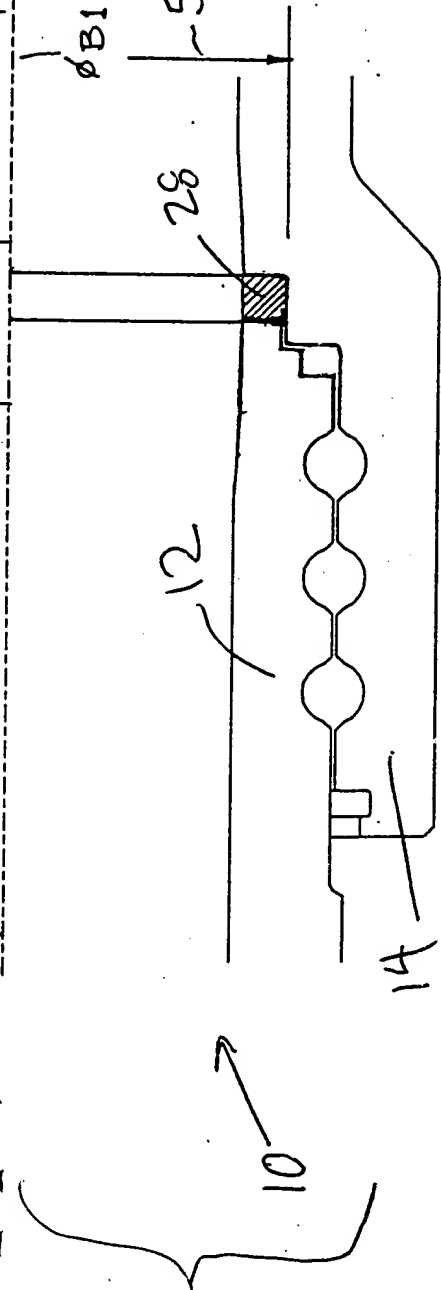
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PRIOR  
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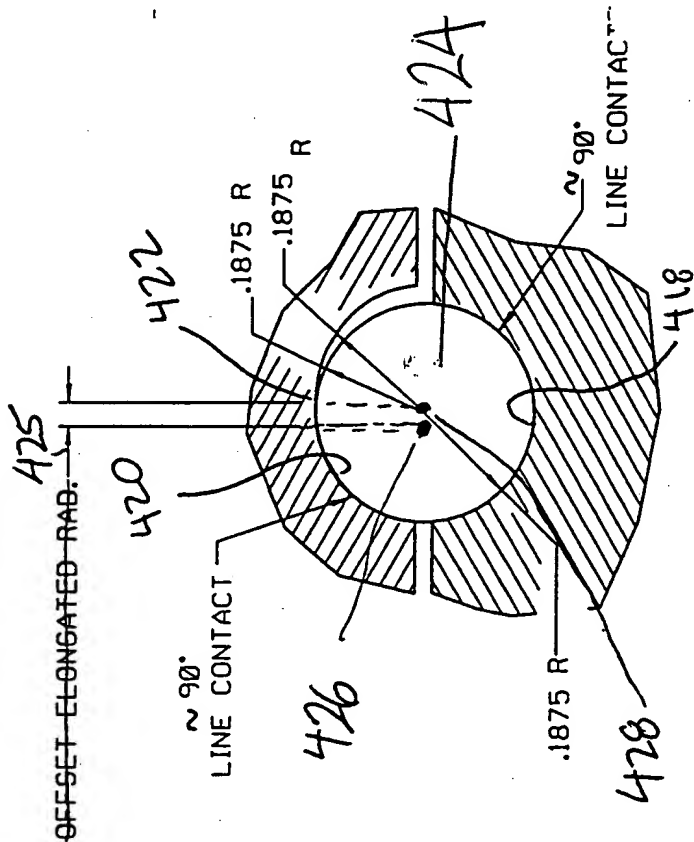
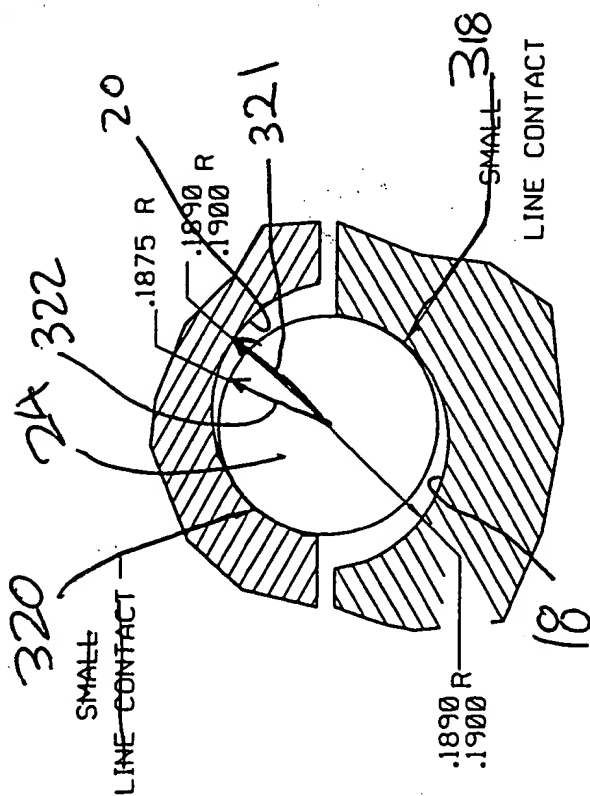
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FIGURE 4



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63-11601  
UNGCHURI ET AL.

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